P.J.P. WHITEHEAD*
Department of Zoology
British Museum (Natural History) - London

TWO NEW RIVER FISHES FROM EASTERN KENYA

INTRODUCTION

To the east of the eastern Rift Valley in Kenya three main river systems drain eastwards, the Athi, the Tana and the Eusso Nyiro. The first two reach the Indian Ocean, but the last is lost in the Lorian Swamp. Provisional lists of fishes in the lower reaches of these rivers (below about 3,500 ft.) have been published (lower Athi, WHITEHEAD 1954; lower Tana, WHITEHEAD 1959; Eusso Nyiro, BOULENGER 1912a), but collections have not been intensive and in many cases specific determinations have been delayed, awaiting comparison with museum material. This is particularly true of the genera *Barbus*, *Mormyrus*, *Gnathonemus* and *Synodontis*. However it has now been possible to compare specimens of *Engraulicypris* and *Physailia* from the Athi and Tana rivers with material in the British Museum and a new species and subspecies are here described.

Engraulicypris fluviatilis sp. nov.

(Figure 1)

Holotype: A female, 73 mm. standard length, from the Athi river near Kithimani (near Yatta). B.M.N.H. Reg. No. 1961.5.3.1.

Paratypes: Five adults, 63-73 mm. standard length, from the same locality.
B.M.N.H. Reg. No. 1961.5.3.2-6.

DESCRIPTION. Based on six adults, 61-73 mm. standard length.

In percentages of standard length: body depth 18.5-21.2, head length 21.0-24.5, snout to dorsal origin 62-72, snout to anal origin

(*) Formerly of Ministry of Forest Development, Game and Fisheries, Nairobi, Kenya.

61-69, pectoral length 23.0-24.5, caudal peduncle length 11.5-14.4, peduncle depth 7.9-8.3.

In percentages of head length: snout length, 26.6-38.5, eye diameter 25.7-27.5, inter-orbital width 33.5-36.6.

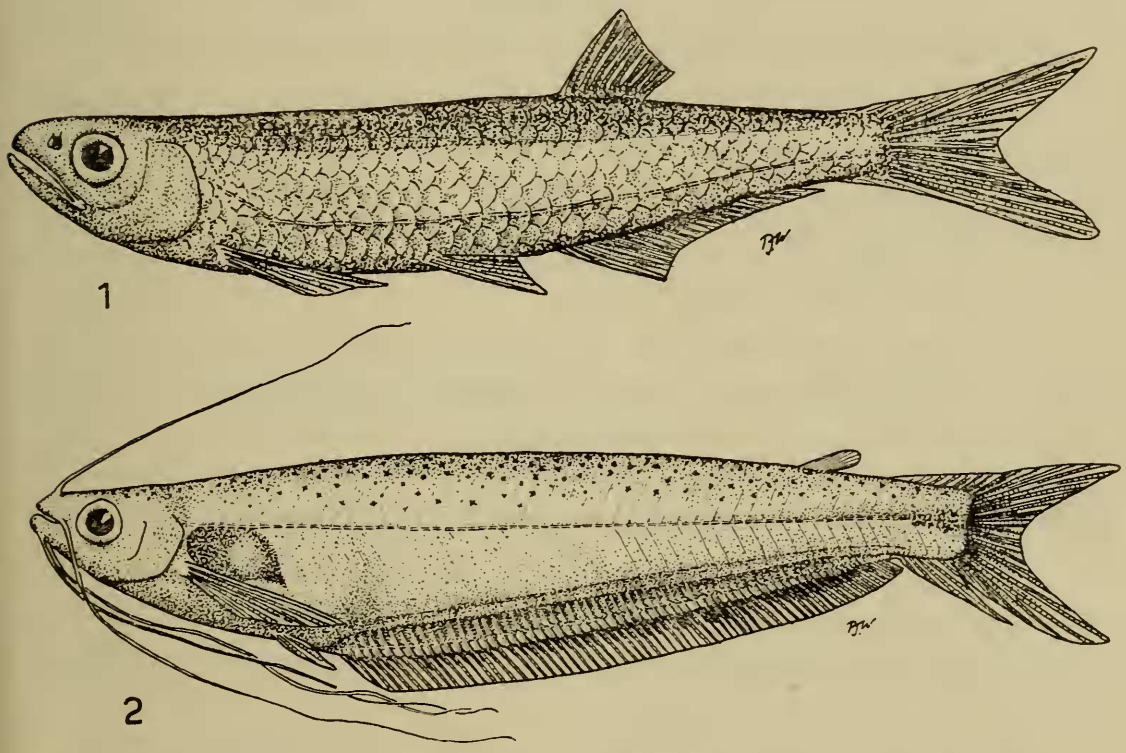

Fig. 1 - *Engraulicypris fluviatilis* sp. nov. Female, 71 mm. standard length.
Fig. 2 - *Physailia somalensis tanensis* subsp. nov. Male, 58 mm. standard length.

Body compressed, its depth slightly less than head length. Head about twice as long as broad. Snout pointed, not projecting beyond mouth, slightly greater than eye diameter, which is a little smaller than inter-orbital width. Mouth extending to below anterior third of eye. Sub-orbitals covering greater part of cheek. Gillrakers short, seven on lower part of anterior gill arch. Dorsal ii 8, its origin just behind that of the anal, first branched ray longest, just over half the length of the head. Anal iii 19-21 (mode 20). Pectoral pointed, equal to head length, just reaching pelvic origin. Caudal deeply forked. Caudal peduncle slender, its depth 1.40-1.78 times in its length.

37-40 lateral line scales, 5½-6 scales between the lateral line and the dorsal base, 1½-2 scales between lateral line and pelvic insertion; 20 predorsal scales; 10 scales round the caudal peduncle.

COLOUR. In life, dorsal surfaces dull green, intense silver on flanks below mid-lateral line, on pre-operculum and operculum. Fins colourless. In form 1 fixed specimens the silver tends to become white.

DISTRIBUTION. Found in the Athi river in the region of Yatta Plateau, but not recorded in this river below the Lugards Falls. Two specimens were also caught in a floodwater pool at Garissa on the Tana river. These fishes have been caught mainly over sandy beaches.

BREEDING. No data available, but the distribution of juveniles suggests that breeding may take place in the shallow, perhaps sandy pools at the edges of the river, and possibly also in the seasonally flooded pools beside the river.

FEEDING HABITS. Insectivorous.

AFFINITIES AND DIAGNOSIS. *E. fluviatilis* differs from most other species in having short and very few gillrakers, and in this it resembles *E. bottegi* (Vincig.) from Southern Ethiopia, Somaliland, Lake Rudolf and the Omo river. It differs from *E. bottegi* in havi g more branched anal rays (19-21; cf 15-17) and fewer lateral line scales (37-40; cf 40-45).

WORTHINGTON and RICARDO (1936) doubted the validity of VINCIGUERRA's Lake Rudolf specimens of *E. bottegi*, believing them to have been *E. stellae* Worthington. I have, however, examined two specimens from the Omo river, which drains into the northern end of Lake Rudolf, and their lateral line counts were 41 and 45, thus distinguishing them from *E. stellae*, which has 34-37. It thus seems likely that there are two species of *Engraulicypris* in the Lake Rudolf basin. *E. stellae* differs from *E. fluviatilis* in having fewer anal rays (14-16) and fewer lateral line scales.

There are three other species with ten or fewer gillrakers (see Table 1). *E. bredoi* Poll of Lake Albert and *E. moeruensis* Blgr. of Lake Mweru have fewer anal rays (11-13 and 14 respectively) and also differ in lateral line scale count, but there is a striking resemblance between *E. fluviatilis* and *E. congicus* Nichols and Griscom, and particularly *E.c. congicus* rather than *E c. rukwaensis* of Lake Rukwa. The latter has fewer anal rays (13-16) and fewer lateral line scales (35-39). RICARDO (1939) gives the ranges for *E.c. congicus* as 16-20 anal rays and 37-42 lateral line scales. But although these ranges appear to overlap those of *E. fluviatilis*, the modal anal ray number is only 16-17, which is well below the range for *E. fluviatilis*. Since there is no indication that the

eastern river fauna of Kenya has any special affinities with that of Lake Tanganyika or the Congo, I do not regard the resemblance between *E. fluviatilis* and *E.c. congicus* as evidence of a closer phyletic relationship than that which pertains between the former and the other eastern species, especially *E. bottegi* and *E. stellae*. A synopsis of the twelve known species is given in Table 1.

Although several purely fluviatile species have rather few gillrakers (*E. fluviatilis*, *E. bottegi*, *E. whitei*, and *E. brevianalis*), and several purely lacustrine species have many gillrakers (*E. argenteus*, *E. minutus* and *E. sardella*), the correlation is not exact, for several lake forms have few gillrakers (*E. moeruensis*, *E. stellae*, *E. bredoi* and *E.c. rukwaensis*). In the first of these however, the gillrakers are rather longer than in the other species.

Physailia somalensis t a n e n s i s subsp. nov.

(Figure 2)

Holotype: A female, 69 mm. standard length, from the Tana river at Hola, Kenya.
B.M.N.H. Reg. No. 1961.5.3.7.

Paratypes: Five adult fishes, 56-59 mm. standard length, from the same locality.
B.M.N.H. Reg. No. 1961.5.3.8-11*; 1961.5.3.12.

DESCRIPTION. Based on six adults, including the holotype, 56-59 mm. standard length.

In percentages of standard length: body depth 18.8-22.5, head length 17.8-19.2, snout length 5.7-6.5, eye diameter 4.4-5.3, nasal barbel 39-61, maxillary barbels (equal in length) 49-52, snout to pelvic 28-30, pectoral length 15.8-16.6.

Body strongly compressed. Snout length greater than eye diameter, which is four times in head length. Jaws equal in front. Barbels reaching to anterior quarter of anal fin. Gillrakers long and slender, 22-27 on the lower part of the anterior arch. Pectorals pointed, slightly shorter than head length, the spine not serrated posteriorly. Pelvic about 1/3 length of pectoral. Anal 61-69 (in one case 72) rays, with a mean of 66 for twenty-two Tana river fishes, the fin narrowly separated from

(*) A paratype has been donated to the Museo Civico di Storia Naturale, Genoa.

the caudal. The latter deeply forked, with pointed lobes, the lower being the larger. In males, a long and pointed genital papilla.

COLOUR. In life, colourless and translucent, swim-bladder showing through skin, dorsal surface and base of anal fin lightly peppered with melanophores. In formol fixed specimens the body becomes white and opaque (yellow-brown in alcohol), but the melanophores are still visible.

DISTRIBUTION. Recorded from the Tana river at Hola and Wema and probably confined to the lower two hundred miles of this river. Specimens in the British Museum (Nat. Hist.) collected at Saka on the Tana by Lord Richard Percy have also been referred to this subspecies.

BREEDING. No data available. The smallest mature specimens recorded were 54 mm. standard length, both males and females.

FOOD. Small crustaceans.

AFFINITIES AND DIAGNOSIS. *P.s. tanensis* differs from *P.s. somalensis* of the Ganana river, Somaliland, in having fewer anal rays. Although in a single case there were 72 rays, the range and mean numbers for the Kenya fishes are well below those from the Ganana. The range described for the latter is 69-72, but I have examined two of the syntypes and the numbers were 72-75. The difference between the Kenya and the Somaliland fishes is shown below.

	Anal rays	
Tana river.		
Hola and Wema specimens	61-69 (M.66.2)	12 fishes.
Lord Richard Percy's specimens	63-68 (M.66.0)	10 fishes.
Ganana river.		
As described	69-72	5 fishes.
Syntypes	72-75	2 fishes.

Five species have been described in this genus. *P. pellucida* Blgr., the most widespread, is associated with the nilotic assemblage of fishes, occurring in the Nile, Niger and Lake Chad systems. In western Africa there are three species, *P. ansorgi* Blgr., *P. villiersi* Blgr., and *P. occidentalis* (Pellegr.), found respectively in Angola, the Congo basin and Gaboon. In eastern Africa there is a single species, *P. somalensis* (Vincig.), described from the Ganana River, Somaliland, and now also found in eastern Kenya.

P. somalensis is unique in this genus in lacking serrae on the posterior face of the pectoral spine. Although the type specimens in se-

veral species are rather small, the serrae, where present, are clearly visible in the juveniles and are not merely adult characters. Serrae have been seen in specimens of *P. ansorgi* of 60 mm. standard length, in *P. pellucida* of 39 mm., and in *P. villiersi* of only 35 mm. BOULENGER

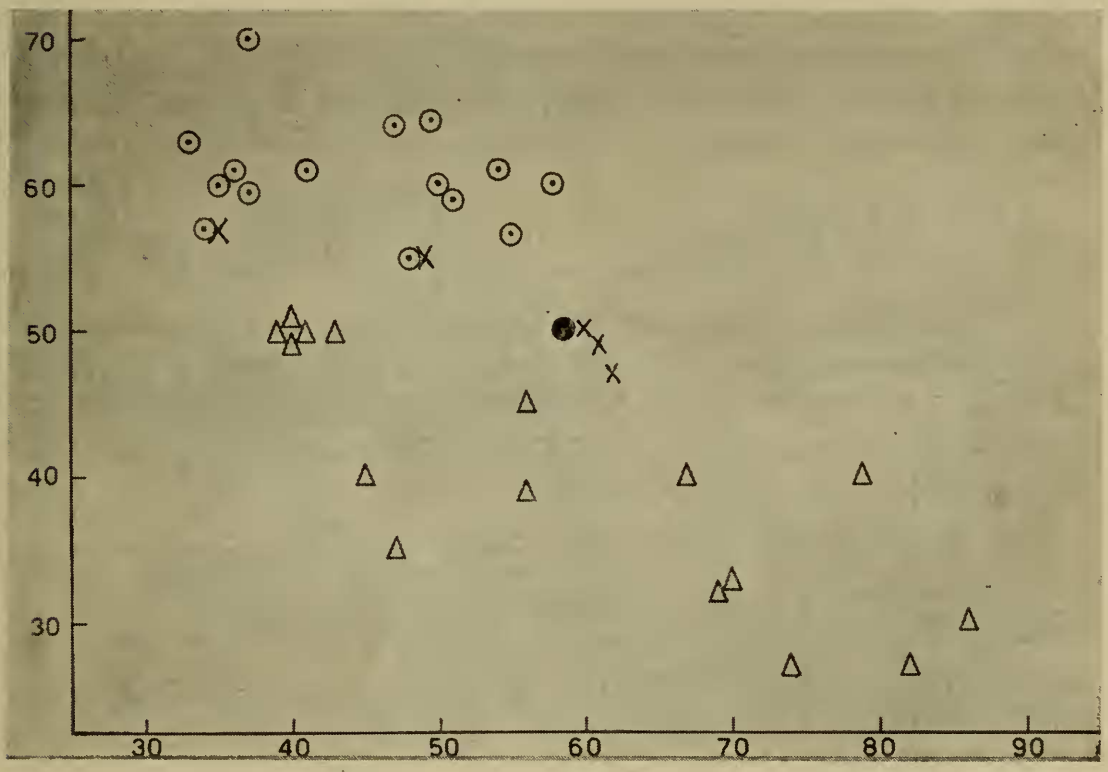

Fig. 3 - Negative allometry in barbel length in species of *Physailia.*

Abscissa, standard length in mms.
Ordinate, longest mandibular barbel as a percentage of standard length.
◎ *P. somalensis tanensis.*
△ *P. pellucida* (types and specimens from Lake Chad basin and Nigeria)
× *P. villiersi* (types)
● *P. ansorgi* (type)

(1912 b) evidently overlooked the small but definite serrae in the latter species.

Mandibular barbel length has been used as a diagnostic character in defining some species. It should however be used with caution since, as shown in Figure 3, barbel length shows negative allometry with standard length, especially in the specimens of *P. pellucida* examined, and

such is probably the case throughout the genus. Measurements for the type of *P. ansorgi* have been given in Figure 3 since this species, described from a single specimen, differs from *P. pellucida* mainly in having slightly longer barbels. There is an indication from the graph that this discrepancy may perhaps result from allometry, but more specimens are required before this can be stated with certainty.

P. pellucida is described as having 65-74 anal rays. I have examined further specimens (see list of study material) and have extended the lower part of this range.

Nile (the types)	62-69 (M.66.8)	10 fishes.
Ejinrin, Lagos Lagoon	60-70 (M.63.8)	10 fishes.

P. occidentalis, described as differing from *P. pellucida* mainly in having fewer anal rays (61), is thus included in the range of the latter and may be synonymous with it. The extended range also eliminates a further difference between *P. pellucida* and *P. ansorgi*, and it is likely that these two should also be united.

It is possible therefore, that further specimens may show that the only trenchant character separating the species of *Physailia* in Africa is the presence or absence of pectoral serrae. If such is the case, then all the forms now found in the Nile and to the west of the Rift Valley should be united into a single species, *P. pellucida*, perhaps with two or more subspecies. If this interpretation is correct, then it might be assumed that the genus is a very old one and that the two populations, to the east and to the west of the Rift Valley, have therefore been separated for a considerable time.

DISCUSSION

The lower and middle reaches of the Athi river have been sampled more often and more thoroughly than the comparable, but less accessible stretch of the Tana river, so that the absence of *Physailia* from the former may be genuine. Also apparently missing from the Athi but present in the Tana are *Petrocephalus catostoma tanensis* and a form of *Gnathonemus macrolepidotus*. Otherwise the fish faunae of the two rivers are identical.

The majority of non-endemic fishes in the Athi and Tana rivers (and there are very few endemics) belong to an eastern river fauna found

to the east of the Rift Valleys, from the Webi Shebeli in the north to the Transvaal in the south. *Tilapia mossambica*, *Clarias mossambicus*, *Labeo cylindricus* and *Petrocephalus catostoma* have a wide distribution in this area. *Labeo gregorii*, *Amphilius platychir*, *Synodontis zambezensis*, *Eutropius depressirostris* and *Gnathonemus macrolepidotus* have a more southerly distribution, while *Clarotes laticeps*, *Physailia somalensis*, *Alestes affinis* and *Mormyrus kannume* extend their range more to the north. Northern and southern elements meet in Kenya, but it is noticeable that the Eusso Nyiro contains more northern elements than do the other two rivers to the south.

The Athi and Tana rivers appear to have had very little connection with the Nile system, only two species being common to both areas (*Clarotes laticeps*, and *Mormyrus kannume*), and it is significant that neither of these occur in Lake Rudolf, despite that lake's nilotic affinities. *Clarias mossambicus* occurs in the Blue but not in the White Nile and does not occur in Lake Rudolf either. BOULENGER (1912a) states that in the case of the Eusso Nyiro to the north of the Tana river, the fishes have nothing in common with the Lake Rudolf fauna, but are most closely related to the Ethiopian fauna.

In general the absence of nilotic fishes from the eastern rivers of Africa suggests that the distribution of these fishes occurred at a time when the eastern watershed was well isolated from that of the west, and that this isolation has been maintained until the present day, except in the region of the Zambezi.

The Athi and Tana fishes also show affinities with the fishes of the Lake Victoria region, many being identical at species level (*Mormyrus kannume*, *Petrocephalus catostoma*, *Garra johnstoni*, *Clarias mossambicus*, *Leptoglanis rotundiceps*, *Amphilius platychir* and *Barbus amphigramma*). In addition, in a revision of certain *Barbus* species, GREENWOOD (1961) places *B. nairobiensis* and *B. percivali* of the Athi and Tana rivers in the synonymy of *B. neumayeri*, which also includes *B. portali* of the Lake Victoria basin; and with *B. kerstenii* of the upper Athi and Tana he includes *B. minchini* of Lake Victoria. Finally, the species of *Gnathonemus* in the Tana river also strongly resembles *G. victoriae* of Lake Victoria.

There are thus ten species which appear to be common to both areas, suggesting that a past water connection, perhaps the head waters of a Proto-Athi, reached westwards across the site of the present Rift Valley. The absence from Lake Victoria and the eastern rivers of many

genera typical of the nilotic assemblage of fishes is further evidence that the two areas share a common past. This also implies that the east-west water divide separating the nilotic from the eastern river faunae lay to the west of the present Lake Victoria. This is at variance with the lower Pliocene drainage pattern suggested by COOKE (1957). However, Dr. COOKE has since sent me an amended version of this figure in which he has sketched in what he considers to be a more likely drainage pattern based on the unpublished work of De Heinzelin; in this, at least a part of the lower Pliocene water-divide lies to the west of Lake Victoria. Certainly this interpretation makes it easier to understand several aspects of the distribution of fishes in the east and central part of Africa.

Physailia is distinguished from *Parailia* (Congo and Niger) only in possessing a small adipose fin. The same difference distinguishes *Eutropius* from *Schilbe*. TREWAVAS (MS) has now questioned the phyletic significance of this adipose fin in the latter case, showing that *E. depressirostris* shows less affinity with its congeners (particularly in certain cranial elements such as the ethmoid, supraoccipital crest and post-temporal bones) than it does with *Schilbe mystus*, into the range of which it could be accommodated but for the presence of the adipose fin. In this light I examined the only material available in the museum (a skeleton each) of *Physailia pellucida* and *Parailia congica*, but both specimens were small and it cannot be said that slight differences between the two (*P. pellucida* for example appears to have a slightly longer skull) either confirm or refute the present generic division based solely on the adipose fin. It is perhaps of interest to note that, while *Eutropius* and *Schilbe* both occur to the west of Africa, only *E. depressirostris* (with an adipose fin) is found to the east of the Kenya Rift Valley; and while *Physailia* and *Parailia* both occur to the west, only *Ph. somalensis* (with an adipose fin) is found to the east of the Rift Valley. This implies that forms with an adipose fin arose secondarily and only after the eastern watershed had become isolated from the west.

ACKNOWLEDGEMENTS

I wish to acknowledge my gratitude to the Trustees of the British Museum (Natural History) for a grant to complete this work and for the facilities afforded me in the Museum. I also wish to thank Dr. E. Tortonese of the Museo Civico di Storia Naturale, Genoa, for sending me type material of *Physailia* and later most generously donating one of these specimens to this museum.

I am especially grateful to Dr. E. Trewavas and Mr. P.H. Greenwood for much helpful criticism of the manuscript.

Table 1.

A comparison of the twelve known species of *Engraulicypris*.

Species	*Number of gillrakers*	*Numbers of anal rays*	*Lateral line Scale counts*	*Distribution*
E. fluviatilis	7	19-21 (mode 20)	37-40	Athi and Tana rivers, Kenya.
E. congicus congicus	7	16-20 (mode 16-17)	37-42	Congo, Lake Tanganyika.
E. congicus rukwaensis	7	13-16 (mode 14-15)	35-39	Lake Rukwa
E. bottegi	7 *	15-17	40-45	Ganana and tribs. of Webi Shebeli, and Omo river
E. stellae	10	14-16	34-37	Lake Rudolf
E. moeruensis	7-8 (long)	14	40-41	Lake Mweru.
E. bredoi	10-11	11-13	35-39	Lake Albert
E. brevianalis	15	12-13	50-52	Transvaal and Zululand
E. whitei	12	15-16	58-59	Aapies river, Transvaal
E. argenteus	16	15-16	48-52	Lake Victoria
E. luluae	not recorded	14-15	32-36	S.E. Congo
E. sardella	30	10-11	48-52	Lake Nyasa and upper Shire river.
E. minutus	18-20	18	37	Lake Tanganyika

* based on specimens from the Webi Shebeli.

List of Study Material

Species	*Locality*	*Brit. Mus. Reg. No.*	*Collected by*
Engraulicypris bottegi	Omo river between Malo and Koscha	1905.7.25.92.-93.	O. Neumann
Physailia somalensis (syntypes)	Ganana river, Lugh (Somaliland)	ex Mus. Genoa N. 14612	V. Bottego
Physailia somalensis tanensis	Saka, lower Tana river, Kenya		Lord Richard Percy
Physailia pellucida	Ejinrin, Lagos Lagoon, Nigeria.	1953.4.25.52-63.	E. Trewavas
	Types. Omdurman, Nile.	1907.12.1.1942-56.	Loat
	Share river, Lake Chad basin.	1928.7.4.67-8	Markham
	Isherri, Ogun River, Nigeria	1956.9.6.7-9	Williams
	Creek near Badagry, 30 miles W. of Lagos	1911.3.30.7-8.	
Physailia ansorgi	Type. Quanza river, Angola	1911.6.1.107.	Ansorge
Physailia villiersi	Types. Lucola river	1912.4.1.425-9.	Ansorge

REFERENCES

BOULENGER G.A. - 1912a - On a collection of fishes made by Mr. A. Blaney Percival in British East Africa to the east of Lake Baringo. - *Proc. zool. Soc.*, pp. 672-676.

— — 1912b - Poissons récueillis dans la region du Bas-Congo par M. le Dr. W.J. Ansorge. - *Ann. Mus. Congo, Zool.*, 2 (3), p. 17.

COOKE H.B.S. - 1957 - Observations relating to Quaternary environments in East and Southern Africa. Alex. L. du Toit Memorial Lectures N.' 5. - *Proc. geol. Soc. S. Afr.*, annexure to Vol. 60, pp. 1-73.

GREENWOOD P.H. - 1961 - A revision of certain *Barbus* (Pisces, Cyprinidae) from East, Central and Southern Africa. - *Bull. Brit. Mus.* (*nat. Hist.*) *Zool.*, 8 (4), pp. 153-208.

RICARDO C.K. - 1939 - The fishes of Lake Rukwa. - *J. Linn. Soc.*, 40 (257), pp. 625-57

TREWAVAS E. - MS: to be published in this journal.

WHITEHEAD P.J.P. - 1954 - A report on the fisheries of the lower Athi (Sabaki) river, Kenya. Unpublished report, *Ministry of Forest Development, Game and Fisheries, Nairobi, Kenya.*

— — - 1959 - Notes on a collection of fishes from the Tana river below Garissa. - *J.E. Afr. nat. Hist. Soc.*, 23, N.° 4, pp. 167-171.

WORTHINGTON E.B. and RICARDO C.K. - 1936 - Scientific results of the Cambridge expedition to the East African lakes, 1930-31. N.° 15. - *J. Linn. Soc.*, 39, pp. 353-89.

RIASSUNTO

Si descrivono due nuovi Pesci africani d'acqua dolce (*Engraulicypris fluviatilis:* fiume Athi; *Physailia somalensis tanensis:* fiume Tana) con note comparative circa le forme affini.

SUMMARY

Two new African freshwater fishes are described (*Engraulicypris fluviatilis:* Athi river; *Physailia somalensis tanensis:* Tana river) with comparative notes on related forms.